CLAIMS

1. A method for producing enzyme granulates, comprising:

a. one or more liquid enzyme formulations are injected via nozzles primarily in a solid-laden processing gas stream,

b. moistened material particles in the heated gas stream are subjected to a drying and granulation process,

c. after a residence time, the particles are separated from the gas stream and returned into a processing chamber,

d. the particles are placed into the gas entry area,

e. fine particles, dust, and particles from the particles entrained by the processing gas are separated and returned to the process as seed material for the formation of granulate, and

f. through material return into the gas stream, a circular flow of solid matter is formed arranged in an axial direction of the reaction chamber.

2. A method for producing enzyme granulates comprising:

a. one or more liquid enzyme formulations are injected into a reaction chamber via nozzles into a processing gas flow laden with solid matter,

b. the moistened material particles are subjected to a drying and granulation process in the heated gas flow,

c. after a residence time the particles, separated from the gas flow, are returned into the processing chamber,

d. the particles are guided via sloped surfaces through gravity to a gas entry area,

e. fine particles, dust, and particles of the particles entrained by the processing gas are separated and returned to the process in the form of seed material for the process for forming granulate,

f. a circular solid matter flow is created, positioned in an axial direction of the reaction chamber, by introducing material into the gas flow via opening gaps which are preferably rotationally symmetrical or elongated.

3. A method according to claim 1, wherein the enzyme granulates are removed from the processing chamber by a sifting device.

4. A method according to claim 1, wherein the enzyme granulates are removed from the processing chamber via volumetric removal units.

5. A method according to claim 1, wherein the enzyme granulates removed from the process that are too small or too big are separated from the finished goods.

6. A method according to claim 5, wherein the enzyme granulates removed from the process that are too small are returned into the processing chamber as seed material.

7. A method according to claim 5, wherein the enzyme granulates removed from the process that are too large are milled by a milling device and returned into the processing chamber as seed material.

8. A method according to claim 6, wherein the enzyme granulates returned to the processing chamber are thermally retreated.

9. A method according to claim 8, wherein the enzyme granulates returned into the processing chamber are dried or preheated.

10. A method according to claim 8, wherein the enzyme granulates returned into the processing chamber are milled.

11. A method according to claim 1, wherein the enzyme granulates are made from various additives and in various mixing ratios.

12. A method according to claim 1, wherein the material particles are subjected to a granulation process after prior spray drying.

13. A method according to claim 1, wherein 1% by weight or more, of a powdery ready-made granulation product, produced according to the method and/or otherwise produced enzyme particles and/or one or more enzyme containing intermediate products, selected from enzyme containing powder or dust, is added to the granulation process.

14. A method according to claim 1, wherein the enzyme granulates produced are coated in a subsequent step by coating with a water-protecting layer.

15. A method according to claim 1, wherein an average value of the residence time of the enzymes in the heated processing chamber amounts to less than 1.5 hours.

16. A method according to claim 1, wherein before or simultaneously to or after step a., or during the granulation process, fine-grained to coarse particular material is added as the seed material for the drying and granulation process.

17. A method according to claim 1, further comprising the enzyme granulates produced having a roundness factor of 1 to 1.6, an average grain size D50 of 60 to 2000 µm (i), wherein when a content of the active enzyme in reference to a sum of active and inactive enzyme content amounts to more than 85 %, the average grain size D50 lies in the range from 650 to 2000 µm, (ii) wherein when a portion of the active enzyme, as defined above, is more than 88 %, the average grain

size D50 is in the range from including 470 to less than 650 µm, (iii) wherein when the portion of the active enzyme, as defined above, is more than 91 %, the average grain size D50 is at 230, including to less than 470 µm, and (iv) wherein when the portion of the active enzyme, as defined above, amounts to more than 95 %, the average grain size D50 ranges from 60 to less than 230 µm, and a residual moisture is below 5 % by weight.

18. A method according to claim 17, wherein a weight ratio of inactive material including inactive enzyme in reference to active enzymes amounts to less than 7 : 1 in reference to a dry weight.

19. A method according to claim 18, wherein the enzyme granulate has an average grain size of 60 through 800 µm, wherein a dust content according to the Heubach test is less than 800 ppm.

20. A method according to claim 19, wherein a pressure resistance of the enzyme granulates is equal or more than 10 MPa.

21. A method according to claim 20, wherein a grain size distribution of the enzyme granulates, defined by a ratio of d10/d90, is equal or greater than 0.4.

22. A method according to claim 20, wherein a bulk density of the enzyme granulate is equal or greater than 500 g/l.

23. A method according to claim 17, comprising phytasis as an enzyme, the phytasis activity of the enzyme granulates is equal or greater than 15 000 FTU/mg.

24. A method according to claim 17, further comprising using the enzyme granulates as an addition or a sole effective component in the production of formulations for food, cleaning, or pharmaceutical purposes.

25. The method according to claim 24, wherein the enzyme granulate is used for the production of feed.

26. The method according to claim 24, wherein the enzyme granulate is used for the production of food.

27. The method according to claim 24, wherein the enzyme granulate is used for the production of a laundry or dishwashing detergent.

28. The method according to claim 24, further comprising using the enzyme granulates as addition or sole effective agent in the production of formulations for food, cleaning, or pharmaceutical purposes.

29. The method according to claim 28, further comprising using the enzyme granulate for the production of feed, food or a laundry or dishwashing detergent.

30. A method according to claim 1, wherein during the drying and granulation process or during parts of the processes one or more inert materials are added as core or seed material and/or as an addition into the enzyme granulate matrix or parts therefrom for diluting the enzyme or enzymes.

31. A method according to claim 30, wherein the inert material or materials are added as solid matter, within the enzyme solution and/or in one or more solutions, suspensions or melts separate from the enzyme solutions.

32. A method according to claim 31, wherein one or more solutions and/or suspensions of the inert material or materials is atomized via one or more separate

nozzles in addition to the nozzle or nozzles for atomizing the liquid enzyme formulation during the drying and granulation process or parts therefrom.

33. A method according to claim 32, wherein one or more material nozzles and a gas for atomizing one or more solutions or suspensions of one or more inert materials are used.

34. Enzyme granulates produced according to the method of claim 30.

35. The use of enzyme granulates according to claim 34 for the production of feed, for the production of food, or for the production of a laundry or dishwashing detergent.